

Application No. 09/670,424
Response to Final Office Action

Customer No. 01933

Listing of Claims:

Claims 1-29 (Canceled).

30. (Currently Amended) A database management apparatus comprising:

a database storage unit which stores a database comprising a plurality of records, each record including a plurality of data segments identified by respective item titles;

an item title ~~memorizing unit for memorizing~~ memory for storing at least one item title for specifying a corresponding at least one data segment group as a target of a data search process;

a key data ~~memorizing unit for memorizing~~ memory for storing keys for use in encryption associated with the database, wherein the keys comprise a column key corresponding to the at least one data segment group specified by the at least one ~~memorized~~ stored item title, and a plurality of different row keys corresponding respectively to the records of the database; and

an encryption unit for encrypting: (i) the data segments of said at least one specified data segment group that is the target of the data search process using the ~~corresponding~~ column key corresponding to the at least one specified data segment group, and (ii) data segments of at least one data segment group

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corresponding to item titles other than the ~~memorized~~ stored item titles, in units corresponding to the records, using the different row keys of the respective records.

31. (Currently Amended) The apparatus according to claim 30, further comprising:

a functional unit which encrypts a received data set comprising a search process condition using the corresponding
5 column key; and

a database search unit which performs the data search process by comparing the encrypted search process condition with the encrypted data segments of said at least one specified group.

32. (Previously Presented) The apparatus according to claim 30, wherein the encryption unit sequentially generates vectors in a multidimensional space based on a set of predetermined functions, and the data segments are encrypted in
5 accordance with an encryption method in which components of the sequentially generated vectors form a key stream of a key associated with the encryption method, and

wherein the row keys and the column key specify constants of the functions.

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33. (Currently Amended) A database system comprising a first information processor terminal storing a database, and a second information processor terminal which is connected to the first information processor terminal via a network and which is adapted to send a request to the first information processor terminal for conducting a search process in the database, wherein the first information processor terminal comprises:

a functional unit which encrypts: (i) data segments forming data segment groups corresponding to column item titles of a first kind using a same column key common to for said data segments forming the data segment groups and, (ii) data segments forming data segment groups corresponding to column item titles of a second kind, in units of rows of data segments, using respective row keys;

wherein the second information processor terminal comprises:

a transmitting unit which transfers via the network, an encrypted data set representing conditions to be used for the search process in the first information processor terminal, when the second information processor terminal requests the first information processor terminal to perform the search process on the database, said encrypted data set being formed by encrypting an input data set specifying the conditions of the search process by using the column key; and

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wherein the first information processor terminal further
25 comprises:

a search performing unit that performs the search
process on the encrypted database, based on the transmitted
encrypted data set; and

a returning unit that returns an encrypted result data
30 set resulting from the search process, to the second information
processing terminal via the network.

34. (Currently Amended) A database management apparatus
comprising:

a key specification ~~memorizing unit that memorizes~~ memory
for storing data specifying a type of encryption system to be
5 used to encrypt data segments of each column of a database, if
the column of the database is to be encrypted;

a first encryption unit that encrypts in accordance with the
data ~~memorized by~~ stored in the key specification ~~memorizing unit~~
memory: (i) data segments forming data segment groups
10 corresponding to column item titles of a first kind using a same
column key for said data segments forming the data segment
groups, and (ii) data segments forming data segment groups
corresponding to column item titles of a second kind, in units of
rows of the database, using row keys respectively specified for
15 each of the rows;

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a second encryption unit that encrypts, using a basic key,
all of the row keys used by the first encryption unit;

a key data generating unit that generates the column key,
the row keys and the basic key; and

20 a storing operation unit which stores in a memory the
database after encryption by the first encryption unit and the
row keys after encryption by the second encryption unit, in a
mutually associated manner.

35. (Previously Presented) The apparatus according to
claim 34, wherein the row keys are each generated based on a
number of the respective rows and a random number.

36. (Previously Presented) The apparatus according to
claim 34, wherein a vector generation unit sequentially generates
vectors confined to a closed subspace of an n-dimensional space
and defined by functions based on the keys; and

5 wherein a logical operation unit performs a logical
operation in units of a bit involving both the data segments of
the database and components of the vectors generated by the
vector generation unit, to encrypt the data segments.

37. (Currently Amended) A method for managing a database
system including a first terminal unit for managing the database

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and a second terminal unit for searching the database
independently of the first terminal unit, said method comprising:

5 encrypting the database by encrypting, on a first terminal
side of the system: (i) data segments forming data segment groups
corresponding to column item titles of a first kind using a same
column key for said data segments forming the data segment
groups, (ii) data segments forming data segment groups
10 corresponding to column item titles of a second kind, in units of
rows of the database, using row keys respectively specified for
each of the rows, and (iii) all of the row keys, using another
key;

15 storing, at the first terminal unit side of the system, the
encrypted database on portable storage medium units for
distribution; and

20 searching the encrypted database stored on any of the
distributed storage medium units, decrypting a data set obtained
as a search result, and displaying the decrypted data set at a
second terminal unit side of the system.

38. (Previously Presented) The database management method
according to claim 37, wherein each of the storage medium units
stores both the encrypted database generated by the first
terminal unit, and a predetermined application program for
5 performing a searching process on the encrypted database.

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39. (Currently Amended) A computer-readable storage medium with a program stored thereon for directing a computer to:

encrypt, in a first mode, data segments forming data segment groups corresponding to column item titles of a first kind using
5 a same column key for said data segments forming the data segment groups, said data segments being elements of a database;

encrypt, in a second mode, data segments forming data segment groups corresponding to column item titles of a second kind using respective row keys corresponding to respective rows
10 of the database; and

encrypting all the row keys used in the second mode using another key assigned commonly for the respective rows.

40. (Currently Amended) A database management apparatus, comprising:

a database storage unit which stores a database comprising a plurality of records, each record including a plurality of data
5 segments identified by respective item titles;

an item title ~~memorizing unit for memorizing~~ memory for storing at least one item title for specifying a corresponding at least one data segment group as a target of a data search process;

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10 a key data ~~memorizing unit for memorizing~~ memory for storing
keys for use in encryption associated with the database, wherein
the keys comprise a column key corresponding to said at least one
data segment group specified by the at least one ~~memorized~~ stored
item title, and a plurality of different row keys corresponding
15 respectively to the records of the database; and
an encryption unit for encrypting: (i) the data segments of
said at least one specified data segment group that is the target
of the data search process using the column key corresponding to
the at least one specified data segment group, and (ii) data
20 segments of at least one data segment group corresponding to item
titles other than the at least one ~~memorized~~ stored item title,
in units corresponding to the records, using the different row
keys corresponding to the respective records and another column
key that is assigned commonly to the data segment groups
25 corresponding to item titles other than the at least one
~~memorized~~ stored item title.

41. (Currently Amended) A computer program for directing a
computer to execute functions comprising:

accessing a database comprising a plurality of records, each
record including a plurality of data segments identified by
5 respective item titles;

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memorizing storing at least one item title for specifying a corresponding at least one data segment group as a target of a data search process;

10 memorizing storing keys for use in encryption associated with the database, wherein the keys comprise a column key corresponding to said at least one data segment group specified by the at least one memorized stored item title, and a plurality of different row keys corresponding respectively to the records of the database; and

15 encrypting: (i) the data segments of said at least one specified data segment group that is the target of the data search process [[,]] using the corresponding column key corresponding to the at least one specified data segment group, and (ii) data segments of at least one data segment group
20 corresponding to item titles other than the memorized stored item titles, in units corresponding to the records, using the different row keys of the respective records.

42. (Currently Amended) A computer program for directing a computer to execute functions comprising:

memorizing storing data specifying a type of encryption system to be used to encrypt data segments of each column of a
5 database, if the column of the database is to be encrypted;

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first encrypting in accordance with the data ~~memorized by~~
stored in the key specification memorizing unit memory: (i) data
segments forming data segment groups corresponding to column item
titles of a first kind using a same column key for said data
10 segments forming the data segment groups, and (ii) data segments
forming data segment groups corresponding to column item titles
of a second kind, in units of rows of the database, using row
keys respectively specified for each of the rows;
second encrypting, with a basic key, all the row keys; and
15 storing in a memory the database after the encryption
thereof and the row keys after encryption the encryption thereof,
in a mutually associated manner.